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*Sertifikaat*

PATENTKANTOOR

REPUBLIC OF SOUTH AFRICA



REPUBLIC VAN SUID-AFRIKA

*Certificate*

PATENT OFFICE

DEPARTEMENT VAN HANDEL  
EN NYWERHEID

DEPARTMENT OF TRADE AND  
INDUSTRY

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- 1) South African Provisional Patent Application No. **2002/0875** accompanied by a Provisional Specification was originally filed at the South African Patent Office on **31 January 2002**, in the name of **IP and Company Holdings (Pty) Limited** in respect of an invention entitled: **"System and method to provide supply chain integrity"**.
- 2) The applicant was subsequently post-dated to **31 March 2002** and further post-dated to **30 April 2002** and thereafter post-dated to **31 May 2002** and further post-dated to **28 June 2002** and thereafter post-dated to **30 July 2002**. By virtue of such postdating, the effective filing date of the applicant is **30 July 2002**.
- 3) The photocopy attached hereto is a true copy of the provisional Specification filed and drawings filed with South African Patent application No. **2002/0875**.

G  
S  
RETORIA in die Republiek van Suid-Afrika, hierdie  
in the Republic of South Africa, this

10th

dag van  
day of

September 2003

**PRIORITY DOCUMENT**  
SUBMITTED OR TRANSMITTED IN  
COMPLIANCE WITH  
RULE 17.1(a) OR (b)

Registrateur van Patente

REPUBLIC OF SOUTH AFRICA  
PATENTS ACT, 1978

APPLICATION FOR A PATENT AND ACKNOWLEDGEMENT OF RECEIPT  
(Section 30 (1) - Regulation 22)  
The grant of a patent is hereby requested by the undermentioned applicant  
on the basis of the present application filed in duplicate.



Form P.1

NB: CHECK form P3 for  
CORRECT  
FEES

OFFICIAL APPLICATION NO	
21	01
2002/0875	

DMK REFERENCE
P237742A00

FULL NAME(S) OF APPLICANT(S)	
71	IP AND INNOVATION COMPANY HOLDINGS (PTY) LIMITED

ADDRESS(ES) OF APPLICANT(S)	
	Building 43C, CSIR Campus Meiring Naude Road Brummeria, Pretoria 0002 South Africa

TITLE OF INVENTION	
54	SYSTEM AND METHOD TO PROVIDE SUPPLY CHAIN INTEGRITY
THE APPLICANT CLAIMS PRIORITY AS SET OUT ON THE ACCOMPANING FORM P2 The earliest priority claimed is	
THIS APPLICATION IS FOR A PATENT OF ADDITION TO PATENT APPLICATION NO.	
21	01
THIS APPLICATION IS FRESH APPLICATION IN TERMS OF SECTION 37 AND BASED ON APPLICATION NO.	
21	01

THIS APPLICATION IS ACCOMPANIED BY :

- |   |     |  |
|---|-----|--|
| X | 1a  | A single copy of a provisional specification of 7 pages.                 |
|   | 1b  | Two copies of a complete specification of pages.                         |
|   | 2a  | Informal drawings of sheets.   |
| X | 2b  | Formal drawings of 2 sheets.   |
|   | 3   | Publication particulars and abstract (form P8 in duplicate).             |
|   | 4   | A copy of figure of the drawings for the abstract.                       |
| X | 5   | Assignment of invention (from the inventors) or other evidence of title. |
|   | 6   | Certified priority document(s).  |
|   | 7   | Translation of priority document(s).                                     |
|   | 8   | Assignment of priority rights.   |
|   | 9   | A copy of form P2 and a specification of S.A. Patent Application.        |
| X | 10  | A declaration and power of attorney on form P3.                          |
|   | 11  | Request for ante-dating on form P4.                                      |
|   | 12  | Request for classification on form P9.                                   |
|   | 13a | Request for delay of acceptance on form P4.                              |
|   | 13b |  |

21	01
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DATED 31 January 2002

ADDRESS FOR SERVICE	
74	D M Kisch Inc 66 Wierda Road East Wierda Valley SANDTON

Patent Attorney for Applicant(s)

REGISTRAR OF PATENTS
RECEIVED DESIGNS, TRADE MARKS AND COPYRIGHT
OFFICIAL DATE STAMP
2002-01-31
REGISTRAR OF PATENTS
REGISTRATEUR VAN PATENTE, MODELLE, HANDELSMERKE EN OUTEURSREG

28-06-03  
31-05-2002  
30-04-2002  
30-07-03

The duplicate will be returned to the applicant's address for service as proof of lodging but is not valid unless endorsed with official stamp.

## REPUBLIC OF SOUTH AFRICA

## PATENTS ACT, 1978

PROVISIONAL SPECIFICATION  
( Section 30 (1) - Regulation 27 )

OFFICIAL APPLICATION NO.		LODGING DATE	DMK REFERENCE
21	01 <b>2001/0875</b>	22 <b>30.07.03</b> <del>28.06.2003</del> <del>31.05.2002</del> <del>30.04.2002</del> <del>01.04.2002</del> <del>31.01.2002</del>	P23774ZA00
FULL NAME(S) OF APPLICANT(S)			
71	IP AND INNOVATION COMPANY HOLDINGS (PTY) LIMITED		
FULL NAME(S) OF INVENTOR(S)			
72	PRETORIUS, Albertus Jacobus HOFFMAN, Alwyn Jakobus		
TITLE OF INVENTION			
54	SYSTEM AND METHOD TO PROVIDE SUPPLY CHAIN INTEGRITY		

**INTRODUCTION AND BACKGROUND**

THIS invention relates to a method and system for detecting an irregularity in a supply chain.

5 Known enterprise resource planning (ERP) techniques and systems are able to detect a limited number and kind of irregularities in a supply chain. More particularly, jurisdictional limitations may have the effect of two or more irregularities cancelling one another so that ERP systems and techniques may be wanting in some applications. Furthermore, the known systems do  
10 not take integrity of data into account.

**OBJECT OF THE INVENTION**

Accordingly it is an object of the present invention to provide a method and system with which the applicant believes the aforementioned problems may  
15 at least be alleviated.

**SUMMARY OF THE INVENTION**

A method of detecting an irregularity in a supply chain forming part of a plurality of supply chains, the method comprising the steps of:

- 20
- gathering over a period of time data collections relating to each of a plurality of transactions in the chains;
  - each data collection comprising an inherent integrity value;

- utilizing the data collections and continually establishing a plurality of
  - patterns relating to the transactions in the chains;
  - continually monitoring at least some of the patterns collectively; and
  - triggering an alarm in the event of a predetermined change in the
- 5                    patterns collectively.

The invention also extends to a system for detecting an irregularity in a supply chain as herein defined and/or described.

#### 10        **BRIEF DESCRIPTION OF THE ACCOMPANYING DIAGRAMS**

The invention will now further be described, by way of example only, with reference to the accompanying diagrams wherein:

figure 1        is a block diagram of a supply chain and parts of the system according to the invention; and

15        table 1        reflects volumes of goods in legs of the chain and relative times of transactions in each leg of the chain.

#### **DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION**

In figure 1 there is shown a supply chain 12 and part of a system 10 according to the invention for detecting irregularities in the chain.

20

The supply chain 12 comprises a manufacturer 14, a distributor 16, a plurality of wholesalers of which two only are shown at 18 and 20 and a plurality of dealers of which two only are shown at 22 and 24.

5 In the applicant's co-pending South African patent application entitled "System and method of authenticating a transaction", there are disclosed a method and system of capturing transaction data in the supply chain and of securing that data. The contents of the specification of this application is incorporated herein by the above reference.

10 In this specification, the term "transaction" is used to denote a transfer of an article by a transferor, such as manufacturer 14 to a receiver, such as distributor 16. Transaction data comprises at least data relating to a unique aspect of the transferor, data relating to a unique aspect of the receiver, data unique to the article and transaction time data. The transaction data is captured as aforesaid and signed digitally as explained in  
15 the aforementioned co-pending application to protect the integrity of the data. The data is then stored in a central database 26 which is under control of a trusted third party (not shown). By capturing, signing and storing the data as aforesaid, it is believed that the stored data has a high  
20 integrity as opposed to data gathered in accordance with conventional enterprise resource planning (ERP) techniques. It is believed that the high integrity data may be used as digital evidence.

In a simple example of movement of articles through a supply chain 12

shown in figure 1 and table 1; the pattern of volume of articles through

each leg  $L_1$  to  $L_5$  of the chain and the pattern of time instants of the

transactions in each of the legs are continually monitored. The symbol  $V_{A1}$

5 indicates the volume of articles of a first kind and the numerals in row 28

indicate the respective volumes in each of the legs  $L_1$  to  $L_5$ . The symbol  $t_{A1}$

indicates the time instant of transactions involving those articles and the

numerals in row 30 indicate the relative time instances of the transactions

involving the articles of the first kind in each of the legs  $L_1$  to  $L_5$ . The

10 symbols  $V_{A2}$ ,  $t_{A2}$ ;  $V_{A3}$ ,  $t_{A3}$ ; and  $V_{A4}$ ,  $t_{A4}$  have corresponding meanings for

articles of a second to fourth kind.

By analyzing the patterns in rows 28 and 30 it is clear that the flow

through the chain of the articles of the first kind is as expected and hence

15 in order.

By analyzing the patterns in rows 36 and 38 it is also clear that the flow

through the chain of the article of the third kind is as expected and hence in

order.

20 By analyzing the volume pattern in row 40, a suspicion is raised by the lack

of data relating to the volume in leg  $L_2$ . However, by analyzing the volume

pattern in row 40 and the time pattern in row 42 compared to those in

rows 30 and 38, it appears that the problem in row 40 may perhaps be a data integrity problem and not an irregularity in the chain. The integrity problem may have been caused by a failure to collect at least some of the transaction data in leg  $L_2$ .

5

In the event of round tripping of articles of the second kind, for example via line 50 shown in figure 1, it is believed that in a closed system where each party in the chain has exclusive jurisdiction over his ERP systems, that through collusion, the ERP system of any party may not detect the round tripping.

10

However, in the method according to the invention, the unexpected time delay where column  $L_3$  and row 34 intersect, would raise a suspicion. By analyzing row 32, it is clear that a larger volume flow is required in leg 1 to result in the flows in the other legs.

15

By comparing the time of transaction rows 30, 34, 38 and 42, it becomes apparent that a potential fraud has occurred in one or more of legs  $L_2$ ,  $L_3$  and  $L_4$ .

20

The method and system according to the invention will trigger an alarm which will then be investigated by experts or expert systems.



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The system 10 according to the invention comprises the aforementioned database 26 with digital evidence. A computerized irregularity detection system 52 comprising a self-learning pattern recognition system is utilized to establish, update, monitor and analyze the patterns.

It will be appreciated that there are many variations in detail on the method and system as herein defined and/or described without departing from the scope and spirit of this disclosure.

DATED THIS THE 31<sup>ST</sup> DAY OF JANUARY 2002.



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D M KISCH INC

PATENT ATTORNEY FOR APPLICANT

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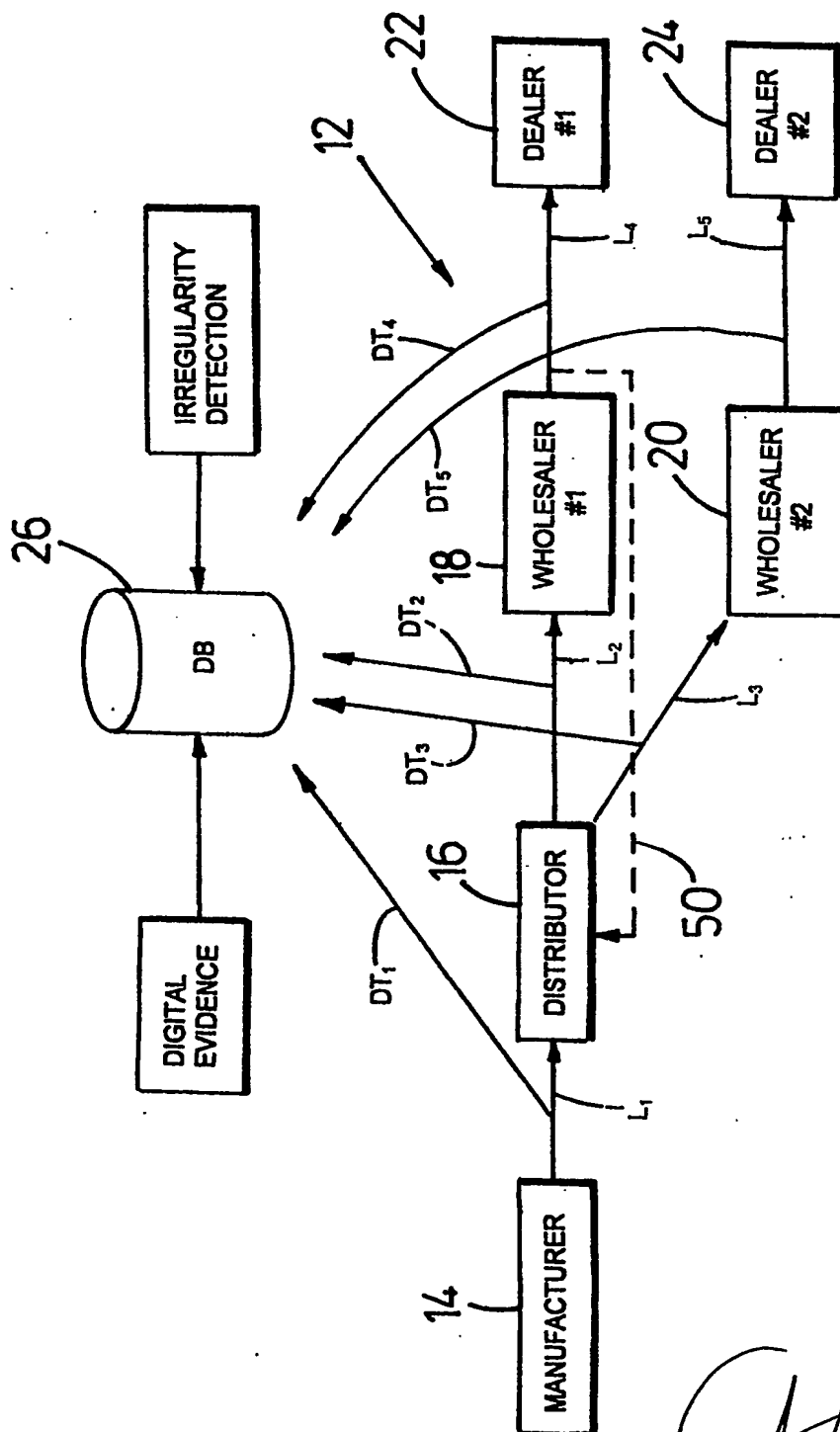


FIGURE 1

	$L_1$	$L_2$	$L_3$	$L_4$	$L_5$	Result	
$V_{A1}$	2	1	1	1	1	in order	- 28
$t_{A1}$	1	2	2	3	3		- 30
$V_{A2}$	1	1	1	1	1	problem	- 32
$t_{A2}$	1	2	4	3	5		- 34
$V_{A3}$	1	-	1	-	1	in order	- 36
$t_{A3}$	1	-	2	-	3		- 38
$V_{A4}$	2	-	1	1	1	suspect but in order	- 40
$t_{A4}$	1	2	2	3	3		- 42

Table 1